TED (10) – 3025

(REVISION – 2010)

Reg. No. .....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

THEORY OF STRUCTURES — II

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define bending stress.
2. State the condition to avoid tension in the masonry of the dam at its base.
3. What is deflection ?
4. What is a continuous beam ?
5. Define Distribution factor. $(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. A rectangular beam 60mm wide and 150mm deep is simply supported over a span of 6m. If the beam is subjected to a central point load of 12kN, find the maximum bending stress induced in the beam section.
2. List the assumptions in the theory of simple bending.
3. What are the advantages of a fixed beam over a simply supported beam ?
4. State the conditions to be satisfied for the stability of a retaining wall.
5. Find the expression for the slope and deflection of a cantilever of length L carrying a point load at the free end.

[100]

Marks

6. A simply supported beam of 2.4m span subjected to a uniformly distributed load of 6kN/m over the entire span. Calculate the maximum slope and deflection of the beam, if its flexural rigidity is $8 \times 10^{12} N/mm^2$.

7. A continuous beam ABC 11 m long rests on three supports A, B and C. Span of AB = 6 with a point load 8kN acting at a distance of 3m from A. Span of BC is 5m and a point load of 10 kN acting at a distance 2.5 m from C. Find the support moment at B. $(5 \times 6 = 30)$

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

Unit — I

III (a) A rectangular beam 200mm deep and 300mm wide is simply supported over a span of 8m. What uniformly distributed load per metre the beam may carry, if the bending stress is not to exceed $120 N/mm^2$? 7

(b) An I - section beam 350mm × 200 mm has a web thickness of 12.5 mm and a flange thickness of 25mm. It carries a shearing force of 200kN at a section. Sketch the shear stress distribution across the section. 8

Or

IV (a) Explain the terms :

(i) Neutral axis (ii) Moment of resistance (iii) Section modulus 8

(b) An I section has the following dimensions.

Flanges = 200mm × 20mm, Web = 360 mm × 10mm. The section carries a distributed Load of 40kN/m run on a span of 10 m, calculate maximum stress produced due to bending. 7

Unit — II

V (a) A rectangular column of width 200 mm and thickness 150 mm carries a point load of 240 kN at an eccentricity of 10mm. Determine the maximum and minimum stresses on the section. 7

(b) Draw the Shear force and Bending moment diagram of a fixed beam subjected to point load at mid span. 8

Or

VI (a) A masonry retaining wall of trapezoidal section is 2m wide at top and 6m at base. Height of the wall is 12m. It retains earth for the full height against vertical face. The earth is level with the top. Find the intensities of stress at the base.

Density of masonry = $24 kN/m^3$, Density of earth = $18 kN/m^3$, Angle of repose 30°. 8

(b) A fixed beam of span 4 m carries a u.d.l. of 25kN/m over the entire length. Draw the S.F. and B.M. diagram and indicate the values. 7

Marks

UNIT — III

VII (a) A cantilever 2 m long carries a uniformly distributed load of 40kN/m on the entire length. Find the deflection and slope at the free end.

$E = 200kN/mm^2$, $I = 160 \times 10^6 mm^4$. 7

(b) A simply supported beam of span 5m carries a central point load of 30kN. Find the maximum slope and deflection in the beam using moment area method. Take $EI = 4200kN/m^2$. 8

OR

VIII (a) A cantilever 5m length carries a point load of 10kN at the free end in addition to uniformly distributed load of 15kN/m over a length 3m from the fixed end. Determine the maximum slope and deflection in the beam.

$E = 2 \times 10^5 N/mm^2$, $I = 3 \times 10^8 mm^4$. 7

(b) Derive the differential equation for slope and deflection. 8

UNIT — IV

IX A continuous beam ABCD of length 15m rests on four supports covering three equal spans and carries a uniformly distributed load of 1.5kN/m length. Calculate the moments and reactions at the supports. Draw the Shear Force and Bending moment diagrams. 15

OR

X A continuous beam ABCD is firmly built in at A and D and freely supported at B and C. Span AB = 6m and carries a u.d.l. of 30kN/m. Span BC = 4m and carries a central point load of 120 kN. Span CD = 3m and carries a point load of 100kN at 2m from D. Determine the support moment using method of moment distribution and draw the B.M. diagram. EI for the beam is constant. 15